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The high societal costs of childhood conduct problems: Evidence from electronic medical and administrative records in a longitudinal birth cohort

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Abstract

Background: Children with conduct problems that persist into adulthood are at increased risk for future behavioral, health, and social problems. However, the longer-term public service usage among these children has not been fully documented. To aid public health and intervention planning, adult service usage across criminal justice, health care, and social welfare domains is compared among individuals who exhibited different subtypes of conduct problems as children.

Methods: Participants are from the Dunedin Multidisciplinary Health and Development Study, a prospective, nationally representative cohort of consecutive births (N=1,037) from April 1972 to March 1973 in Dunedin, New Zealand. Regression analyses were used to compare levels of public service usage, gathered via administrative and electronic medical records, between participants who displayed distinct subtypes of childhood conduct problems.

Results: Children exhibiting early-onset and persistent conduct problems used significantly more services as adults than those with low levels of childhood conduct problems. Though this group comprised only 9.0% of the population, they accounted for 53.3% of all convictions, 15.7% of emergency department visits, 20.5% of prescription fills, 13.1% of injury claims, and 24.7% of welfare benefit-months. They were also more likely than those with low-conduct problems to accrue high service use across all three domains of criminal justice, health, and social welfare services (OR=7.27, 95% CI=[4.42-12.0]).

Conclusions: Conduct problems in childhood signal high future costs in terms of service utilization across multiple sectors. Future evaluations of interventions aimed at conduct problems should include potential benefits that stretch well into midlife.

Keywords: conduct disorder; service utilization; administrative data; electronic medical data; longitudinal study

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Abbreviations: Conduct Disorder (CD); Life-course persistent (LCP); Childhood-limited (CL); Adolescent-onset (AO); New Zealand (NZ)

Background

Children and adolescents with Conduct Disorder (CD) engage in persistent and repetitive behaviors that violate the rights of others (e.g., fighting, bullying, theft) or basic social rules (e.g., running away from home, being truant from school). The worldwide prevalence of CD is approximately 50 million, and CD is currently estimated to account for 5.75 million years lived with disability globally (Erskine et al., 2014; Whiteford et al., 2013). Children with CD are at increased risk for a wide range of physical, mental, and social problems as adults (Colman et al., 2009), and this is especially true for children who exhibit an early-onset and persistent pattern of conduct-problem symptoms (Colman et al., 2009; Moffitt, Caspi, Harrington, & Milne, 2002; Odgers et al., 2008; Piquero, Daigle, Gibson, Piquero, & Tibbetts, 2007; Piquero, Shepherd, Shepherd, & Farrington, 2011).

CD presents a significant threat to population and public health globally due to the large number of young people affected and the poor long-term prognosis for behavior and health. Yet relatively little is known about longer-term public service usage among individuals with distinct patterns of conduct problem symptoms. Public sector costs of supporting individuals with childhood conduct problems have been previously estimated by prospectively following children referred to a clinic or otherwise screened as at-risk for conduct problems (Romeo, Knapp, & Scott, 2006; Scott, Knapp, Henderson, & Maughan, 2001). For example, among 142 clinically referred 10-year old children in London, cumulative public expenditures by age 28 were 10 times higher among those with versus without a CD diagnosis and 3.5 times higher among those with a CD diagnosis versus those with subclinical symptoms (Scott et al., 2001). Similarly, among

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kindergarten children identified as high-risk for behavioral problems in the United States, those with versus without a CD diagnosis ($N = 59$) were estimated to consume nearly \$70,000 (in year-2000 USD) more per child in public services across adolescence (Foster & Jones, 2005). Across these studies, children with the most severe symptoms incurred the highest public expenditures. However, the longer-term societal and public service costs associated with conduct problem symptoms among children in the general population – who can often be identified based on parent and teacher reports – have not yet been fully described.

In the present study, three decades' worth of reports of children's conduct problems were combined with electronic medical records and administrative records of social service use and crime to describe the long-term public service costs associated with early-onset conduct-problems. Developmental subtypes of conduct problems were identified previously based on parent, teacher, self, and informant reports (Odgers et al., 2007). The conduct-problem subtypes included: children with early-onset and persistently high levels of conduct problems (on the life-course persistent pathway), children who experienced elevated levels of conduct problems only in childhood (on the childhood-limited pathway), only in adolescence (adolescence-onset pathway), or never (the low pathway) (see **Figure 1**), with subtypes mapping onto a widely used developmental taxonomy of childhood versus adolescent-onset conduct problems (Moffitt, 1993; Moffitt et al., 2008). Information from electronic medical records and administrative data was integrated to test the following questions.

First, we tested whether children following a life-course persistent (LCP) trajectory of conduct problems consume a disproportionately higher amount of public services in adulthood compared to their peers following other conduct-problem trajectories. Children on the LCP trajectory are at increased risk for a wide array of mental and physical health problems

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throughout their late twenties and thirties (Moffitt et al., 2002; Odgers et al., 2007; Piquero et al., 2007, 2011). By age 32, Dunedin study members following the LCP pathway had elevated mental and physical health problems, including elevated markers of inflammation, sexually transmitted disease, symptoms of chronic bronchitis, self-reported smoking, nicotine dependence, and serious injuries (Odgers et al., 2007). Due to their increased risk of health and behavioral problems, individuals on the LCP pathway may be expected to use more than their share of health and public services. However, it is also possible that those on the LCP pathway, who may also be socially marginalized due to their behavior or background, would consequently leave a smaller footprint than expected on public services (Lawrence & Kisely, 2010).

Second, we tested whether children following the childhood-limited pathway consume more services as adults than their peers following the low-conduct problem trajectory. Many children in this cohort (Odgers et al., 2008) and others (Veenstra, Lindenberg, Verhulst, & Ormel, 2009) exhibit elevated conduct problems in childhood that rapidly decline into the normative range. The question for these children is whether they are “true recoveries” and go on to have similar long-term health care and social service usage as their peers without childhood conduct problems. One longitudinal study reported a number of poor adult outcomes for individuals with childhood-limited conduct problems (Jennings, Rocque, Fox, Piquero, & Farrington, 2016). Our own prior findings suggested that those following the childhood-limited pathway were at a slightly elevated risk for anxiety and nicotine dependence in young adulthood, but that their overall mental and physical health prognosis was not markedly different than the cohort norm, that is, those on the low-conduct problem pathway (Odgers et al., 2008). Thus we hypothesized that individuals following the childhood-limited pathway will consume slightly

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more services than their peers on the low-conduct problem pathway, but that they will not rival the high levels of service use by their peers on the LCP pathway.

Methods

Participants

Participants are members of the Dunedin Multidisciplinary Health and Development Study, a longitudinal investigation of the health and behavior of a representative birth cohort of consecutive births between April 1972 and March 1973 in Dunedin, New Zealand (Poulton, Moffitt, & Silva, 2015). The cohort of 1,037 children (52% boys) was constituted at age 3 as 91% of eligible births resident in the province. The cohort represents the full range of socioeconomic status on NZ's South Island and matches the NZ National Health and Nutrition Survey on adult health indicators (e.g., BMI, smoking, GP visits). Cohort members are primarily white; approximately 7% self-identify as having any non-white ancestry, matching the South Island. Follow-up assessments were conducted at ages 5, 7, 9, 11, 13, 15, 18, 21, 26, 32, and most recently 38, when 95% of the 1,007 living study members underwent assessment in 2010-2012. Informed consent from living Study members was obtained at the age-38 assessment for administrative record searches. Institutional review boards of the participating universities approved the study protocol.

Of the original cohort of 1,037 individuals, 931 study members (89.8%) were included in our analyses. Similar to a previously described analysis of administrative records in this cohort, we excluded 16 study members who died before reaching adulthood, 35 who were either long-term missing to the study or refused administrative records search, and 46 who no longer resided in NZ and thus would not be expected to accumulate service usage in NZ (Caspi et al., 2016).

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Additionally, 3 study members for whom childhood conduct problems could not be assessed were excluded.

Measures

Developmental subtypes of antisocial conduct problems were identified in previous work using general growth mixture modeling and 1,020 of the original 1,037 study members were assigned to a conduct-problem trajectory group (Odgers et al., 2007, 2008). Conduct problems were assessed prospectively at ages 7, 9, 11, 13, 15, 18, 21, and 26 via mother and teacher report in childhood, self-reports of conduct problems in adolescence, and by informant and self-reports in young adulthood. Six key symptoms of conduct disorder were scored as being present or absent at each age: physical fighting, bullying others, destroying property, telling lies, truancy, and stealing. Study members were classified into life-course persistent (LCP; 9.0%), adolescent-onset (18.6%), childhood-limited (22.1%), and low (50.3%) trajectories of conduct problems (see **Figure 1**).

Service utilization outcomes in adulthood

Service utilization was assessed using data from New Zealand's nationwide administrative databases. Matching to administrative records occurred after the age-38 assessment. As previously reported (Caspi et al., 2016), the majority of outcome measures derived from administrative data include information from age 26 to age 38, with exceptions noted below.

Convictions for crime. Information about criminal convictions was obtained by searching the central computer system of the New Zealand Police. The cohort had over 2,000 convictions in criminal courts, 653 of which occurred from age 26 to the end of the observation period.

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Hospital-bed nights. Details of admission events to public hospitals were obtained from Ministry of Health records. From age 26 to the end of the observation period, the cohort accumulated a total of 5,131 inpatient bed-nights.

Emergency department visits. Information on emergency department visits was obtained from Ministry of Health records. Outcomes were only available from 2006 (ages 34 and 35) to the end of the observation period, during which time the cohort was responsible for a total of 937 emergency department visits.

State-subsidized prescription drug fills. Information about prescription drugs filled by pharmacists was obtained from the nationwide Pharmaceutical Management Agency database. Claims were not consistently recorded with a matchable identifier until 2005; thus, this measure is only included from 2006 (ages 34 and 35) to the end of the observation period, in which the cohort filled a total of 66,802 prescriptions.

Injury insurance claims. Records of insurance claims for accidents and injuries were obtained from the Accident Compensation Corporation, the national provider of comprehensive, no-fault personal injury cover for New Zealanders. From age 26 through the end of the observation period, the cohort made a total of 4,284 claims.

Social-welfare benefit-months. Information about social-welfare benefits received were obtained from the New Zealand Ministry of Social Development. From age 26 through the end of the observation period, the cohort accumulated a total of 13,745 social-welfare benefit-months.

High multiple-domain usage. High service utilization across the three domains of criminal justice, social welfare, and health was measured by identifying study members in the top quartile for criminal convictions, social-welfare benefit-months, and any one of the following

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health outcomes: hospital bed-nights, emergency department visits, prescription fills, or injury claims. 187 study members (20.1%) were observed with high multiple-domain usage.

Statistical Analyses

All analyses were conducted with version 14 of StataSE; analyses proceeded as follows. First, Poisson regression models were used to test whether children on the LCP pathway, on average, consumed more criminal justice, health care, and social welfare services in adulthood than their peers on the low, childhood-limited, and adolescent-onset pathways. The average number of criminal convictions, hospital bed-nights, prescription fills, emergency department visits, injury claims, and social-welfare benefit-months by trajectory group are reported. Additionally, the proportion of total services used by children on the LCP pathway was computed to describe whether they consumed more than their expected share of services as adults. Next, Poisson regression models were used to investigate whether individuals following the childhood-limited pathway resembled “true recoveries” in terms of their service utilization by testing whether they used significantly more services than their peers on the low-conduct problem trajectory. Finally, logistic regression models were used to test whether LCP and childhood-limited study members had significantly higher odds of accumulating high multiple-domain service usage relative to those on the low conduct-problem trajectory.

Results are presented as unadjusted comparisons of group means across the conduct-problem subgroups. Alternative specifications were also fit to the data and illustrated that results from between-group comparisons were robust to both months spent outside of New Zealand and the differential sex composition of conduct trajectory groups by statistically controlling for months spent in the country and sex, respectively (see Supplemental Tables 1 and 2). Furthermore, patterns of service use across conduct trajectory groups were similar for males

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versus females, as evidenced both by disaggregating results by sex and by testing for sex interactions in all models (see Supplemental Tables 3 and 4).

Results

The average service usage across justice, health, and social welfare domains is summarized by conduct trajectory group in **Table 1**, alongside statistical tests of between-group differences. The proportion of service usage attributable to each of the different conduct-problem subgroups is visually displayed in **Figure 2**. Key findings from Table 1 and Figure 2 are described below.

Do children on the LCP pathway consume more services as adults than their peers?

Criminal convictions

LCP study members had, on average, significantly more criminal convictions than those on the low-conduct problem (LCP: 4.2 vs. Low: 0.1), childhood-limited (0.5), and adolescent-onset (0.9) pathways (see **Table 1**). Study members on the LCP pathway comprised only 9.0% of the cohort, but they accounted for 50.4% of the group's total convictions (see **Figure 2**).

Health care outcomes

Compared to their peers on the low trajectory, study members on the LCP pathway had, on average, significantly more emergency department visits (LCP: 1.8 vs. Low: 0.6), prescription fills (LCP: 100.0 vs. Low: 27.9), and injury insurance-claims (LCP: 6.8 vs. Low: 3.7); they also had more hospital bed-nights (LCP: 9.0 vs. Low: 4.4), although this difference was not statistically significant at the .05 level ($p=.08$). Additionally, LCP study members accumulated significantly more prescription fills than study members on the childhood-limited trajectory (LCP: 100.0 vs. CL: 38.8) and more injury insurance-claims than those on the adolescent-onset trajectory (LCP: 6.8 vs. AO: 5.2). Though LCP study members comprised 9.0% of the study

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population, they accounted for 14.7% of all hospital bed-nights, 15.7% of all emergency department visits, 20.5% of all prescription fills, and 13.1% of all injury claims among the cohort.

Benefit-months

LCP study members accumulated significantly more benefit-months than those on the low (LCP: 41.4 vs. Low: 6.4), childhood-limited (17.1), and adolescent-onset pathways (23.3). Despite comprising 9.0% of the cohort, they accounted for 24.7% of the total benefit-months accumulated by the study population.

High Multiple-domain Usage

Of the study members on the LCP conduct-problem trajectory, 50.0% exhibited high service usage across all three domains, compared to 11.3% of those following the low trajectory, a statistically significant difference (OR=7.27, 95% CI=[4.42-12.0]).

Do children on the childhood-limited trajectory represent true recoveries?

Criminal Convictions

As shown in **Table 1**, study members on the childhood-limited pathway had significantly elevated levels of criminal convictions compared to individuals following the low pathway (CL: 0.5 vs. Low: 0.1). However, as noted above, their average convictions remained well below those accumulated by their peers on the LCP pathway (CL: 0.5 vs. LCP: 4.2).

Health care outcomes

Compared to their peers on the low pathway, study members on the childhood-limited pathway had significantly more emergency department visits (CL: 1.5 vs. Low: 0.6) and injury insurance-claims (CL: 5.5 vs. Low: 3.7), but they did not differ significantly from those on the low pathway in terms of hospital bed-nights or prescription fills.

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Benefit-months

Study members on the childhood-limited pathway accumulated significantly more benefit-months than their peers on the low pathway (CL: 17.1 vs. Low: 6.4). However, as described above, they had significantly fewer benefit-months than those on the LCP pathway.

High Multiple-domain Usage

Of the study members on the childhood-limited trajectory, 18.9% accumulated high service use across all three domains, compared to 11.3% of those in the low trajectory, again, a statistically significant difference (OR=1.80, 95% CI=[1.15-2.81]).

Discussion

Many children and adolescents experience conduct problem symptoms, and for those who experience early-onset and persistent symptoms, the prognosis across multiple life outcomes in adulthood is poor (Colman et al., 2009; Erskine et al., 2014; Moffitt et al., 2002). Findings from this study advance what is known about the long-term costs of childhood conduct problems at the population level in three ways. First, this study provides evidence that individuals following the LCP pathway account for a greater service burden than their peers across criminal justice, health care, and social-service sectors in adulthood. For criminal justice-related findings, this was expected and is consistent with the “life-course persistent” nature of conduct problems for those on the LCP pathway (Moffitt, 1993). Similarly, the increased utilization of social welfare services fits with prior evidence demonstrating poor economic outcomes for those with early-onset and persistent conduct problems (Colman et al., 2009; Moffitt et al., 2002). While it is not surprising that those on the LCP pathway account for more than their share of criminal justice and social welfare services in adulthood, the magnitude of the burden is striking: LCP

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study members were responsible for over 50% of the entire cohort's criminal convictions and nearly 25% of its benefit-months, despite only comprising 9% of the population.

With respect to health care outcomes, study members following the LCP pathway accounted for more health care service use across a range of measures. This finding is consistent with prior research documenting a higher incidence of physical health problems among those on the LCP pathway (Moffitt et al., 2002; Odgers et al., 2008). Between-group differences in health care service usage were not as large as those observed for criminal convictions. However, the relatively young age of this cohort implies fuller coverage of criminal justice versus health care services as the age-crime curve peaks during the early twenties whereas the onset of disease and health problems is expected to increase as study members move past midlife (Lozano et al., 2012; Petras, Nieuwbeerta, & Piquero, 2010). To the extent that early health-care utilization serves as a proxy for poor future health, it is possible that the individuals on the LCP pathway will continue to account for an increasingly greater share of health-care utilization over time.

Second, findings indicate that those following the childhood-limited conduct trajectory do not experience complete recovery; instead, on average, they account for more criminal convictions, emergency department visits, injury claims, and benefit-months as compared to their peers on the low-conduct problem pathway. Although their service usage was elevated in comparison to the cohort norm, children who followed a childhood-limited trajectory did not accumulate similar levels of criminal convictions and social welfare service usage as their peers on the LCP pathway.

Finally, in addition to the societal costs associated with public service utilization, this study points to a significant and disproportionate individual burden born by those with early-onset and persistent conduct problems. For the 44% who acquire an official criminal record, they

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can anticipate incurring direct financial (e.g., fines) and personal (e.g., loss of liberty due to incarceration) costs, in addition to lower expected future earnings and, in many cases, barriers to employment related to their criminal history (Western, Kling, & Weiman, 2001). To the extent that health-care utilization is a proxy for poor physical health, individuals with early-onset and persistent conduct problems are also more likely to incur personal costs related to greater disease morbidity and mortality.

This study was novel in that it allowed for an assessment of the societal burden of persistent conduct problems across early- to mid-adulthood via administrative records, further along the life-course than has previously been investigated. The integration of over 12 years of public record data, with in-depth assessments of childhood conduct problems across the first three decades of life, provides an unprecedented test of the long-term societal costs associated with distinct trajectories of childhood conduct problems. However, these findings should also be interpreted in the context of the study's limitations. First, we did not assign monetary values to outcome measures, preventing comparison of the relative economic weight across different service domains. Future cost-benefit analyses of intervention and population-level studies should more precisely estimate dollar amounts that accompany these public expenditures. Second, service usage was only observed as incurring within-participant; costs of conduct problems that are incurred by others were not captured. This omission is especially relevant with respect to criminal convictions, given the large costs for victims of crime and for society at large (Erskine et al., 2014). Moreover, this omission can be expected to bias our estimates of societal costs associated with the LCP pathway downward. Third, this study was restricted to a single cohort in New Zealand and, as such, findings warrant replication in other contexts. Finally, this analysis was descriptive and does not allow for causal inference about the effect of conduct disorder itself

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versus other potentially explanatory or confounding factors on the number or types of services utilized.

With these limitations in mind, the following implications of these findings for research and practice can be considered. First, the disproportionate service use across multiple sectors by those on the LCP pathway in adulthood provides yet another reason to support policies and practices designed to support children exhibiting early-onset and persistent conduct problems. The extent of the cost reduction associated with such a strategy will be dependent on the causal nature of the relationship between early conduct problems and later service use, a question that cannot be addressed here. However, evidence from randomized treatment studies suggests that early behavioral interventions can effectively reduce conduct problems (Conduct Problems Prevention Research Group, 2011; Hutchings et al., 2007; Woolfenden, Williams, & Peat, 2002), and that such reductions are associated with decreased service usage through adolescence and, for some, into young adulthood (Bonin, Stevens, Beecham, Byford, & Parsonage, 2011; Dodge et al., 2015; Edwards, Cailleachair, Bywater, Hughes, & Hutchings, 2007).

Second, our findings suggest that conduct problems in childhood, regardless of whether they persist, signal future service usage across a wide range of sectors, including criminal justice, health care, and social services. For the multiple systems that encounter and can identify children with conduct problems, including the criminal justice system (with early behavioral referrals), pediatric clinics (with annual visits and observations), and educational settings (with parent and teacher reports like those used in this study), these findings suggest an early window of opportunity to prevent future health-related problems and, potentially, reduce the future burden of service usage.

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Third, our findings support the need to recalculate the costs of childhood CD to include adulthood health care alongside criminal justice and social welfare expenses; similarly, they suggest that the cost savings associated with effective CD interventions may be expected to accumulate through mid-life, a period through which most intervention studies have not yet followed study participants. The message from these electronic medical and administrative data summaries is clear – childhood conduct problems, especially those that persist, are a strong and early signal of high societal and individual costs across criminal justice, health-care, and social service sectors.

Conclusion

Conduct problems in childhood signal high future costs to society and to the individual in terms of service utilization across criminal justice, health, and social welfare domains. Social policies and clinical interventions aimed at reducing childhood conduct problems warrant further attention, and the costing of such policies should consider potential returns on investment across multiple sectors and into midlife.

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Ethical Considerations

The Otago University Ethics Committee, Duke University, and King's College London provided ethical approval for the Dunedin Study. Informed consent from living Study members was obtained at the age-38 assessment for administrative record searches.

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Key Points

What's known:

- Children with conduct problems that persist into adulthood are at increased risk for behavioral, physical, mental, and social problems as adults. However, their public service usage profiles are not well documented or understood.
- Up to 1 in 4 children exhibit conduct problems but then desist. While these children no longer suffer from conduct problems as adults, it is unknown whether they are true “recoveries” in other domains.

What's new:

- Evidence from a population-representative sample that children with early-onset and persistent conduct problems are responsible for over half of all criminal convictions in the population and close to 25% of social welfare benefit months. Half of these children will go on to become high service users across all three sectors of criminal justice, health and social services.
- Childhood conduct problems, regardless of whether they persist, signal elevated risk of future societal costs for society and the individual.

What's clinically relevant:

- Interventions aimed at childhood conduct problems may have cost reduction effects that reach well into adulthood and span multiple public service domains.

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Figures and Tables

Table 1. Average criminal justice, health and social service use by conduct-problem trajectory group

		Low	CL	AO	LCP	LCP vs Low	LCP vs CL	LCP vs AO	CL vs Low
	<i>N</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>p</i>	<i>p</i>	<i>p</i>	<i>p</i>
Convictions	922	0.1 (0.7)	0.5 (1.9)	0.9 (2.7)	4.2 (8.6)	<0.001	<0.001	<0.001	<0.001
Hospital bed-nights	920	4.4 (12.4)	6.8 (24.0)	5.5 (13.1)	9.0 (31.1)	0.078	0.548	0.253	0.122
Emergency visits	920	0.6 (2.1)	1.5 (5.8)	1.2 (2.6)	1.8 (2.8)	<0.001	0.583	0.128	0.008
Prescription fills	920	37.2 (172.5)	39.2 (110.2)	140.0 (544.7)	211.9 (797.3)	<0.001	<0.001	0.412	0.863
Injury claims	916	3.7 (4.3)	5.5 (6.7)	5.2 (5.5)	6.8 (6.4)	<0.001	0.134	0.043	<0.001
Benefit-months	917	6.4 (20.6)	17.1 (37.0)	23.3 (40.3)	41.4 (49.3)	<0.001	<0.001	0.002	<0.001

Table 1: Mean service utilization from approximately age 26 to age 39/40 (age 33/34 to age 39/40 for emergency department visits and prescription fills) by conduct trajectory. Between-group comparisons made with Poisson regression models; *p*-values are for the simple comparison of means, with no covariates.

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Figure 1. Conduct problem trajectory groups identified among Dunedin Cohort study members

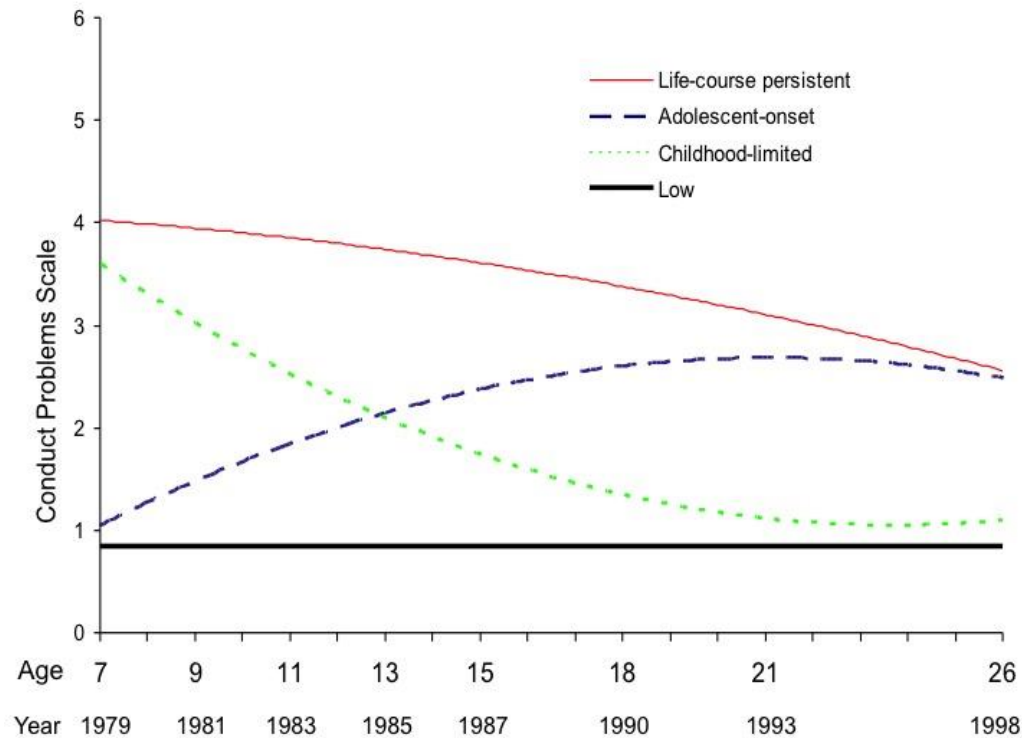


Figure 1: Illustration of conduct-problem trajectories reprinted with permission from Odgers et al., 2008, *Development and Psychopathology*. Study members (N=1,037) were classified as following one of four conduct-problem trajectories: Life-course persistent: 9.0%; Adolescent-onset: 18.7%; Childhood-limited: 22.0%; Low: 50.4%. Trajectories were originally identified separately among male study members (Life-course persistent: 10.5%; Adolescent-onset: 19.6%; Childhood-limited: 24.3%; Low: 45.6%;

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Odgers et al., 2007). Corresponding trajectories were also identified separately among female study members (Life-course persistent: 7.5%; Adolescent-onset: 17.4%; Childhood-limited: 20.0%; Low: 55.1%; Odgers et al., 2008).

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Figure 2: Proportion of total convictions, health care, and social welfare service usage by conduct-problem trajectory group

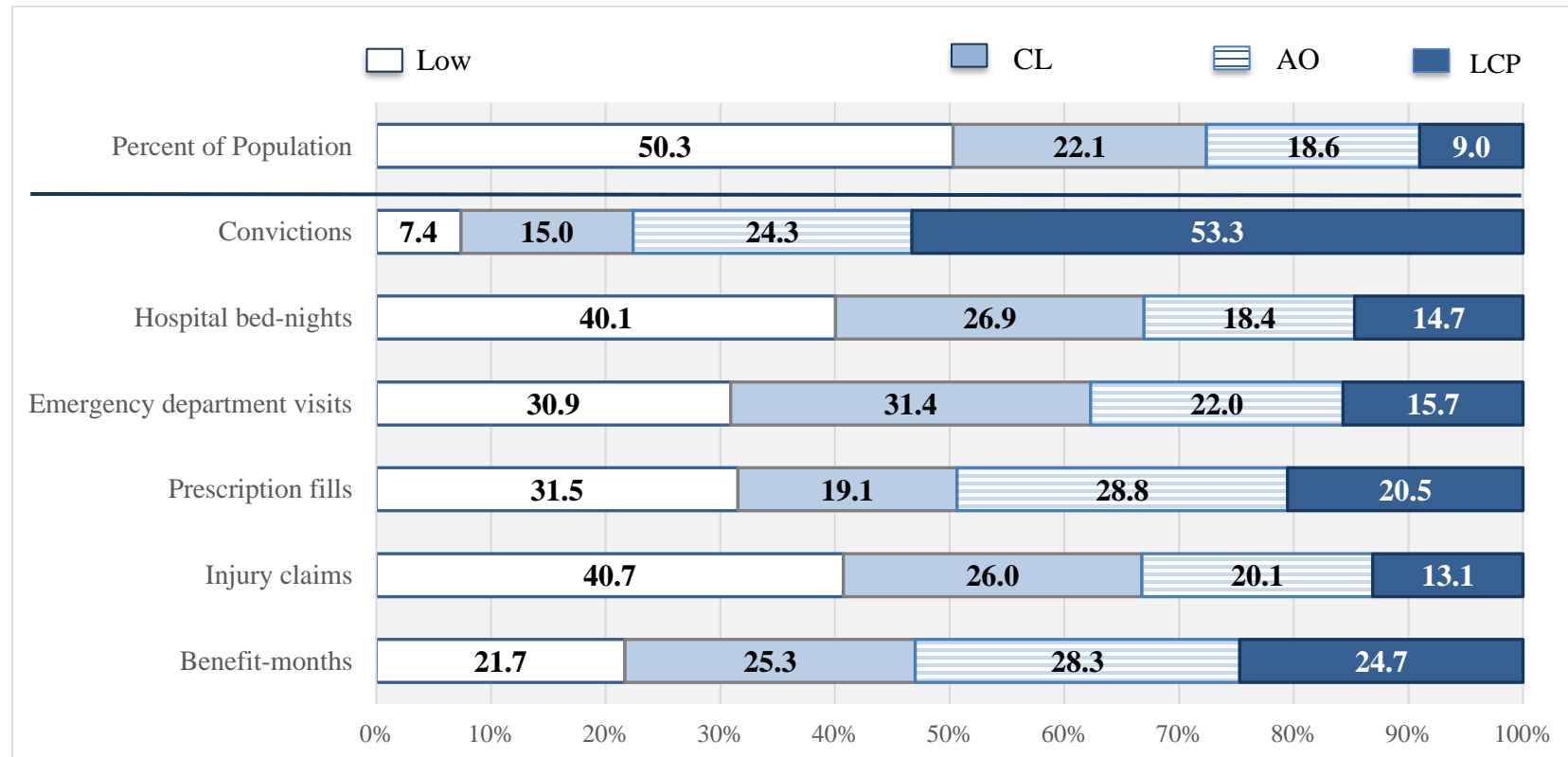


Figure 2: Proportion of total service usage from approximately age 26 to age 38, by conduct-problem trajectory group. The top row shows the proportion of the study population that each conduct-problem trajectory comprises; subsequent rows show the proportion of a given type of service accounted for by each group.